Trend Study 2-36-01

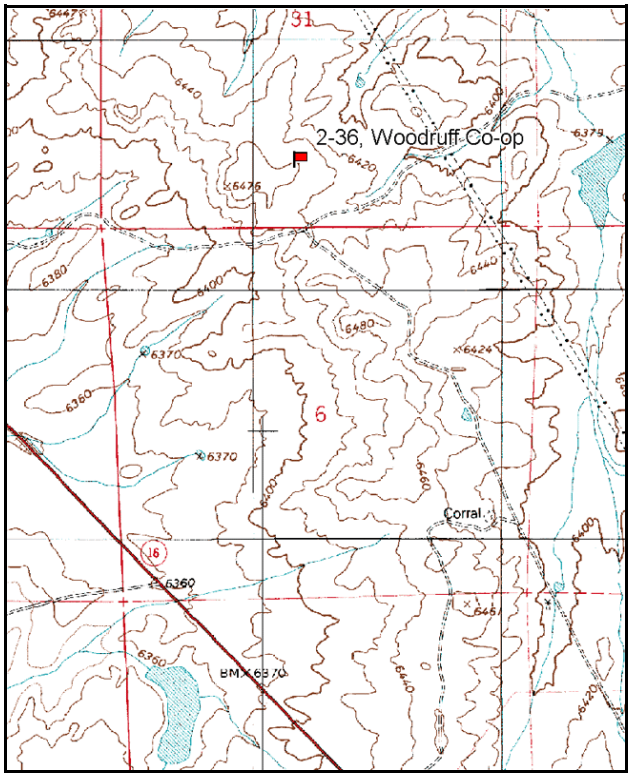
Study site name: Woodruff Co-op . Vegetation type: Big Sagebrush .

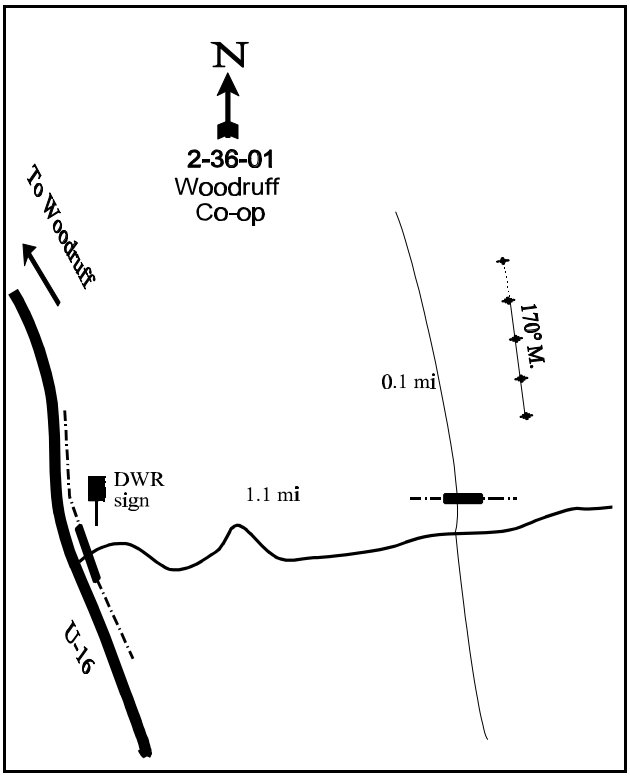
Compass bearing: frequency baseline 170 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the junction of U-39 and U-16 in Woodruff, travel south on U-16 5.7 miles to the Woodruff Co-op Livestock Management Area. Turn left (east) through the gate. Drive 1.1 miles to a fork. Turn left and go north through the gate. From the gate, go 0.1 miles. The study is on the east side of the road, approximately 60 paces to the 0-foot baseline stake. The study stakes are short fenceposts. The baseline stakes are easily seen from the road so no witness posts were needed. The 0-foot baseline stake is marked with browse tag #55.





Map Name: Neponset Reservoir NE

Diagrammatic Sketch

Township 9N , Range 8E , Section 31

UTM 4590485 N, 493173 E

DISCUSSION

Trend Study No. 2-36

The Woodruff Co-op trend study was established in 1990 on DWR property. The purpose of this study is to monitor sagebrush reestablishment on a treated site dominated by introduced perennial grasses. Study site elevation is approximately 6,500 feet on a nearly flat, southeast-facing slope. The allotment continues to be used for spring cattle grazing. It is also antelope range that is used by deer and elk in the winter. Signs of sage grouse are also common. Pellet group transect data collected in 2001 estimated 3 elk days use/acre (7 edu/ha), 7 deer days use/acre (18 ddu/ha), and 41 cow days use/acre (102 cdu/ha). Deer pellet groups appear to be from the previous fall and winter, while elk pellet groups appear more recent.

The soil is moderately deep with an estimated effective rooting depth (see methods) of 13 inches. Soil texture is a sandy clay loam with a neutral soil reaction (pH of 7.2). Phosphorus could be a limiting factor at only 3.9 ppm as values of less than 10 ppm can limit plant growth and development. Pavement and rock cover are limited. The percentage of vegetative cover is moderate due to the dense stand of crested wheatgrass, but there is also a significant amount of bare soil in all sampling years. Cryptogams are abundant around the base of crested wheatgrass plants. An erosion condition class conducted in 2001 determined soils to be stable. Soil pedestalling provides evidence that some erosion has occurred in the past.

Wyoming big sagebrush and winterfat are the most important browse species on the site. Wyoming big sagebrush density was estimated at 320 plants/acre in 1996, increasing to 420 plants/acre in 2001. The slight increase in density was due to recruitment from young plants. Sagebrush density was estimated at nearly 1,000 plants/acre in 1990. The decrease in density between sampling years is due to the much larger sample used in 1996 and 2001. This sample gives considerably greater accuracy for species that are clumped and/or discontinuous in their distributions. The majority of sagebrush plants encountered show light to moderate hedging and are relatively small in stature. Percent decadency has steadily decreased from a high of 31% in 1990 to 0% in 2001. Vigor is good throughout the population. Annual leader growth averaged just over 1 inch in 2001, even though mature plants had abundant seed production. Under the current grazing schedule of early spring use, an increase in browse species should be favored. However, increases in sagebrush are small at the present time.

Winterfat is the most abundant shrub on the site with an estimated density averaging about 2,600 plants/acre in 1996 and 2001. This species is composed primarily of mature plants (90%) with good recruitment from young plants (10%) in 2001. Vigor is good throughout the population and percent decadency is low over all sampling years. Annual leader growth was good on winterfat (a warm season species) in 2001, averaging nearly 5 inches. Other browse that are present on the site include low rabbitbrush, broom snakeweed, gray horsebrush, and pricklypear cactus.

The herbaceous understory is totally dominated by crested wheatgrass which accounted for 94% of the grass cover and over 80% of the total vegetative cover in 1996 and 2001. Crested wheatgrass was sampled in every quadrat in all 3 years that the site was monitored. Crested wheatgrass had been moderately utilized over the entire site in 2001. Sandberg bluegrass, needle-and-thread, and Indian ricegrass were also sampled on the site. Forbs are limited and provide very little cover or forage. Hoods phlox and longleaf phlox are the most abundant of the perennial forb species. Pale alyssum, an annual, is also fairly abundant, significantly increasing in nested frequency in 2001.

1990 APPARENT TREND ASSESSMENT

Under the current livestock grazing regime, Wyoming big sagebrush would be expected to increase. This would create an upward trend for deer and antelope winter range. The study is in a good location to monitor changes in relative composition and indicate when, and if, adjustments should be made in livestock grazing. Soil condition is also an important aspect to monitor. The dense herbaceous cover currently provides fair protection, and trend appears stable to slightly downward.

1996 TREND ASSESSMENT

Trend for soil is up due to a 38% decline in percent bare ground. Herbaceous vegetation is abundant and well dispersed, effectively limiting erosion. Density of Wyoming big sagebrush is still relatively low and does not show signs of increasing. The new much larger sample used in 1996 estimated only 320 plants/acre. No seedlings or young were encountered. The lack of dead plants would suggest that the 1990 population density was overestimated with the smaller sample size. The only positive aspect of the browse trend is an improvement in percent decadency which declined from 31% to 6%. Trend for browse is considered stable. Trend for the herbaceous understory is also stable. Sum of nested frequency for crested wheatgrass increased, with the sum of nested frequency for all perennial grasses remaining similar to 1990. Sum of nested frequency for perennial forbs declined; however, forbs are rare and produce only 1% total cover.

TREND ASSESSMENT
soil - up (5)
browse - stable but very limited population (3)
herbaceous understory - stable (3)

2001 TREND ASSESSMENT

Trend for soil is stable. The ratio of bare soil to protective ground cover slightly improved, and except for pedestalling in the past, erosion is minimal. Trend for browse is stable overall. Wyoming big sagebrush remains limited, but shows a slightly upward trend with an increase in young plants. Decadency decreased from 6% to 0%, and vigor is good on all plants. Winterfat is the most abundant species and has a stable trend. Density estimates are similar to 1996, where young plants outnumber the decadent and dead in the population. Trend for the herbaceous understory is stable. Crested wheatgrass remains the dominant species. Sum of nested frequency for perennial grasses slightly increased in 2001, but not enough to warrant an upward trend.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 36

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
G	Agropyron cristatum	$_{ab}$348	$_{b}$360	$_{a}$344	100	100	100	22.46	30.84
G	Oryzopsis hymenoides	5	-	4	3	-	1	-	.03
G	Poa secunda	89	90	99	46	35	38	1.38	1.44
G	Stipa comata	$_{ab}$11	$_{a}$1	$_{b}$24	5	1	9	.03	.45
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		453	451	471	154	136	148	23.88	32.77
Total for Grasses		453	451	471	154	136	148	23.88	32.77
F	Alyssum alyssoides (a)	-	$_{a}$41	$_{b}$159	-	16	56	.10	.40
F	Antennaria spp.	-	2	-	-	1	-	.00	-
F	Astragalus convallarius	-	-	4	-	-	2	-	.06
F	Astragalus utahensis	$_{b}$7	$_{a}$-	$_{ab}$3	5	-	1	-	.03
F	Phlox hoodii	$_{b}$83	$_{a}$43	$_{a}$33	40	20	18	1.10	.41
F	Phlox longifolia	$_{b}$81	$_{a}$37	$_{b}$70	34	16	34	.08	.24
F	Schoencrambe linifolia	-	3	-	-	1	-	.00	-
F	Tragopogon dubius	-	3	8	-	1	3	.00	.06
F	Trifolium spp.	$_{b}$11	$_{a}$-	$_{c}$26	5	-	14	-	.11
Total for Annual Forbs		0	41	159	0	16	56	0.10	0.40
Total for Perennial Forbs		182	88	144	84	39	72	1.19	0.93
Total for Forbs		182	129	303	84	55	128	1.30	1.33

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 02 , Study no: 36

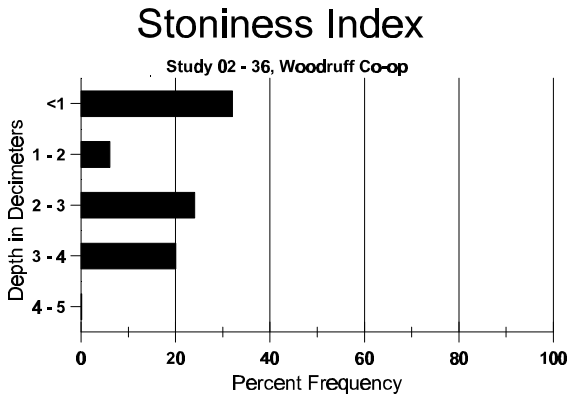
Type	Species	Strip Frequency '96	Strip Frequency '01	Average Cover % '96	Average Cover % '01
B	Artemisia tridentata wyomingensis	14	16	.28	.96
B	Ceratoides lanata	40	42	.59	.53
B	Chrysothamnus nauseosus consimilis	0	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	33	34	.26	.75
B	Gutierrezia sarothrae	5	7	.03	.33
B	Opuntia polyacantha	12	11	.18	.34
B	Tetradymia canescens	8	3	.06	-
Total for Browse		112	114	1.41	2.92

BASIC COVER --
Herd unit 02 , Study no: 36

Cover Type	Nested Frequency '96	Nested Frequency '01	Average Cover % '90	Average Cover % '96	Average Cover % '01
Vegetation	364	351	16.75	28.00	39.97
Rock	225	133	1.75	2.09	1.01
Pavement	251	279	1.25	3.02	1.88
Litter	397	379	36.50	34.31	44.11
Cryptogams	51	143	.50	.28	2.07
Bare Ground	339	344	43.25	26.78	36.09

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 36, Woodruff Co-op

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.2	63.0 (14.1)	7.2	56.6	14.1	29.4	2.1	3.9	108.8	.7



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 36

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Sage Grouse	-	-	26	N/A
Rabbit	10	7	200	N/A
Elk	-	-	35	3 (7)
Deer	8	6	96	7 (18)
Cattle	15	19	496	41 (102)
Antelope	6	-	-	-

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 36

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	90	2	1	-	-	-	-	-	-	-	3	-	-	-	100			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	90	7	9	1	-	-	-	-	-	-	16	1	-	-	566	10	16	17
	96	10	4	-	-	-	-	1	-	-	15	-	-	-	300	14	24	15
	01	12	4	-	-	-	-	-	-	-	16	-	-	-	320	18	29	16
D	90	1	7	-	-	1	-	-	-	-	8	1	-	-	300			9
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'90	62%	03%	00%	-67%
'96	31%	00%	00%	+24%
'01	19%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'90	966	Dec:	31%
	'96	320		6%
	'01	420		0%

Atriplex gardneri falcata																			
M	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	5	5	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'90	33	Dec:	-
	'96	0		-
	'01	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ceratoides lanata																		
Y	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	96	3	2	-	9	-	-	-	-	-	14	-	-	-	280			14
	01	12	-	-	-	-	-	-	-	-	12	-	-	-	240			12
M	90	3	4	-	-	-	-	-	-	-	7	-	-	-	233	7	5	7
	96	9	60	46	1	-	-	-	-	-	116	-	-	-	2320	7	9	116
	01	45	67	1	-	-	-	-	-	-	113	-	-	-	2260	8	9	113
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	2	1	-	-	-	-	-	-	3	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'90	40%	00%	00%	+87%
'96	48%	35%	00%	- 6%
'01	54%	.80%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'90	333	Dec:	0%
	'96	2660		2%
	'01	2500		0%

Chrysothamnus nauseosus consimilis																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	2	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'90	0	Dec:	-
	'96	0		-
	'01	40		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	90	2	9	-	-	-	-	-	-	-	10	1	-	-	366			11
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	90	12	15	-	-	-	-	-	-	-	27	-	-	-	900	4	6	27
	96	38	-	-	2	-	-	-	-	-	40	-	-	-	800	7	11	40
	01	52	-	-	-	-	-	-	-	-	52	-	-	-	1040	7	11	52
D	90	7	-	-	-	-	-	-	-	-	7	-	-	-	233			7
	96	4	-	-	-	-	-	-	-	-	1	-	-	3	80			4
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'90	53%	00%	00%	-41%
'96	00%	00%	07%	+17%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'90	1499	Dec:	16%
	'96	880		9%
	'01	1060		2%

Gutierrezia sarothrae																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	5	-	-	1	-	-	-	-	-	6	-	-	-	120	5	7	6
	01	11	-	-	-	-	-	-	-	-	11	-	-	-	220	7	12	11

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'90	00%	00%	00%	
'96	00%	00%	00%	+45%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'90	0	Dec:	-
	'96	120		-
	'01	220		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia polyacantha																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	90	6	-	-	-	-	-	-	-	-	5	-	1	-	200	4	6	6
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	4	12	10
	01	20	-	-	-	-	-	-	-	-	19	1	-	-	400	3	9	20
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	1	-	-	2	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'90	00%	00%	13%	+ 5%
'96	00%	00%	14%	+33%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'90	266	Dec:		0%
'96	280			21%
'01	420			0%

Tetradymia canescens																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	5	3	1	-	-	-	-	-	-	9	-	-	-	180	5	9	9
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	5	13	3
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'90	00%	00%	00%	
'96	40%	10%	00%	-70%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'90	0	Dec:		0%
'96	200			10%
'01	60			0%